Prioritizing the PMTCT Implementation Research Agenda in 3 African Countries: INtegrating and Scaling up PMTCT Through Implementation REsearch (INSPIRE)

Abstract: Countries with high HIV prevalence face the challenge of achieving high coverage of antiretroviral drug regimens interventions including for the prevention of mother-to-child transmission of HIV (PMTCT). In 2011, the World Health Organization and the Department of Foreign Affairs, Trade and Development, Canada, launched a joint implementation research (IR) initiative to increase access to effective PMTCT interventions. Here, we describe the process used for prioritizing PMTCT IR questions in Malawi, Nigeria, and Zimbabwe. Policy makers, district health workers, academics, implementing partners, and persons living with HIV were invited to 2-day workshops in each country. Between 42 and 70 representatives attended each workshop. Using the Child Health Nutrition Research Initiative approach, interdisciplinary stakeholders systematically identified programmatic barriers and formulated IR questions that addressed these challenges. IR questions were scored by individual participants according to 6 criteria: (1) answerable by research, (2) likely to reduce pediatric HIV infections, (3) addresses main barriers to scaling-up, (4) innovation and originality, (5) improves equity among underserved populations, and (6) likely value to policy makers. Highest scoring IR questions included health system approaches for integrating and decentralization services, ways of improving retention-in-care, bridging gaps between health facilities and communities, and increasing male partner involvement. The prioritized questions reflect the diversity of health care settings, competing health challenges and local and national context. The differing perspectives of policy makers, researchers, and implementers illustrate the value of inclusive research partnerships. The participatory Child Health Nutrition Research Initiative approach effectively set national PMTCT IR priorities, promoted country ownership, and strategically allocated research resources.

Key Words: PMTCT, research, prioritize, national, Malawi, Nigeria, Zimbabwe

INTRODUCTION

Implementation research (IR) is a broad term and “can address or explore any aspect of implementation, including the factors affecting implementation (such as poverty, geographical remoteness, or traditional beliefs), the processes of implementation themselves (such as distribution of fully-subsidized insecticide-treated bed nets through maternal health clinics, or the use of mass vaccination versus surveillance containment), and the outcomes, or end-products of the implementation under study.” It aims not only to understand barriers to high-quality care but also to test solutions of how health services might better deliver proven clinical interventions and take them to scale. It calls for multidisciplinary teams and for research design approaches that are responsive to the context while still being rigorous and robust.

The opportunity to eliminate new pediatric HIV infections is contingent on countries achieving not only high rates of initiating antiretroviral (ARV) drugs among pregnant HIV-infected women but also retaining them in care and supporting them to adhere to treatment. The challenges to completing these steps for preventing mother-to-child transmission of HIV (PMTCT) and improving the health and survival of...
HIV-infected mothers can be enormous. Pregnant women may not readily accept HIV testing because of concerns about confidentiality and stigma in the community; health workers may struggle to provide high-quality antenatal care to large numbers of women while at the same time remain sensitive to needs of a woman who has just learned that she is HIV-infected; the ARV drug supply chain may not be absolutely reliable such that women do not consistently receive their ARVs throughout pregnancy and while breastfeeding; post-partum HIV follow-up care may not be established and primary health facilities; HIV-infected women may not feel able to disclose their status to close family members, or the father of the child, for fear of discrimination or rejection. These, and many more cumulative influences, have resulted in HIV-infected women and their infants failing to benefit from effective interventions, resulting in what is often referred to as the “PMTCT cascade.”

Although countries are committed to achieving the global goal of preventing new HIV infections in children, the most significant barriers to effective delivery of PMTCT interventions are likely to vary by country and setting. The IR agenda to support PMTCT programmes should therefore reflect the most common and important obstacles to care. As part of a joint IR initiative between the World Health Organization (WHO) and the Department of Foreign Affairs, Trade and Development, Canada, prioritization exercises were conducted in Malawi, Nigeria, and Zimbabwe to establish what were the most important barriers to implementation of PMTCT programmes and which should be prioritized for research interventions. The objectives of the exercises were as follows:

- To identify and prioritize the key operational issues and implementation challenges for effective delivery of PMTCT interventions—this included a full list of perceived barriers and the top 8 challenges in each country;
- To share information on the WHO–Department of Foreign Affairs, Trade and Development, Canada IR initiative;
- To identify potential partnership teams; and
- To link and synergize with additional IR efforts in-country.

Here, we describe the process developed by the Child Health Nutrition Research Initiative (CHNRI) and that has been used to identify priorities for newborn and child health research, and how it was applied in each of the 3 countries to identify national PMTCT IR priorities that would subsequently be addressed through specific projects.

**METHODS**

In September 2011, the Ministries of Health (MOH) in Malawi, Nigeria, and Zimbabwe, with support from the WHO country offices, convened 2-day meetings in Lilongwe, Abuja, and Harare, respectively. Between 40 and 70 academics/researchers, district health workers, implementing partners, people living with HIV/AIDS, and policy makers attended the meetings in each country.

In each of the meetings, a similar approach was followed:

1. **Review of PMTCT programmes: key barriers and facilitating factors (plenary)**
2. **Identification of the major barriers and problems (in groups and plenary)**
3. **Free listing of research questions to address the above barriers (in plenary)**
4. **Agreement on consolidated list of questions (plenary)**
5. **Scoring of questions on 6 predefined criteria (individual)**
6. **Presentation and discussion of ranking based on total scores (plenary).**

MOH representatives gave presentations that described national PMTCT programmes, including protocols, coverage data, and considerations of barriers to achieving high quality care. The WHO staff facilitated plenary discussion during which additional perspectives were shared. Participants then broke into 3 stakeholder groups: (1) academics who were mainly involved with research, (2) district health staff and other partners who were mainly involved with implementation, and (3) national or provincial staff and representatives of United Nation agencies and bilateral agencies who were mainly involved with policy or programme planning and management or funding. Participants were asked to self-identify which stakeholder group they should join. These stakeholder groups met separately to “free-list” programmatic problems and barriers from their perspectives. Referring to the programmatic barriers identified in this way, the groups then formulated research questions that addressed these challenges. For example:

**Problem:** HIV-infected pregnant women do not attend all the recommended antenatal clinic visits.

**Question:** How can HIV-infected pregnant women be encouraged and supported to attend all the recommended antenatal care visits?

**Problem:** Routine health data collection systems are not able to link information about mothers and their infants.

**Question:** How can health workers collect and record routine health data, even in remote and under-resourced settings, so that health information about mothers can be linked with health information about their infants?

The lists of IR questions were collected from the respective groups and, overnight, were collated to remove duplicates and improve the clarity of language. The following day, participants were asked to review the consolidated list of IR questions and to check if their questions were satisfactorily captured. Edits were included as needed.

Each individual participant then scored all IR questions according to 6 criteria:

- Is this question answerable by research?
- Would an answer to this question likely reduce pediatric HIV infections and mortality in HIV-infected mothers?
- Does the question address the main barriers to scale-up?
- Would the solution to the question represent innovation and originality?
- Would the solution to the question improve equity by helping scale up among underserved populations?
- Would an answer to this question be of value to policy makers and influence policy?
Scores were entered into an MS Excel spreadsheet and analyzed using simple frequency charts. Results were presented for the entire group and were also disaggregated by stakeholder group: (1) academics, (2) district health staff and other partners, and (3) national, provincial staff, and representatives of agencies. Participants were asked to comment on the analysis and overall prioritization.

Participants were then advised of what would follow the workshop namely dissemination of the results and call for research proposals.

**RESULTS**

In Malawi, there were 41 participants (excluding the WHO secretariat); a total of 55 challenges were identified and these were reframed as 29 IR questions. In Nigeria, there were 77 participants (excluding the WHO secretariat); in total, 136 challenges were identified that were reframed and consolidated into 31 IR questions. In Zimbabwe, there were 73 participants (excluding the WHO secretariat) who identified 48 challenges that were reframed as 30 IR questions.

The main challenges and 8 highest ranked IR questions for each country are presented in Tables 1 and 2.

Some challenges were common across participant groups in the respective countries. Among national partners, health systems and community structure issues, such as funding, human resource capacity and gender equity/male involvement, were prominent. Among area and local district staff, difficulties with infrastructure, organization of services including the supply chain of ARVs, and HIV testing kits were common. Implementing partners cited both health system challenges including staff attitudes and turn-around time for blood results and also issues related to uptake and adherence by individual women. Challenges identified by MOH staff and academics reflected issues that seemed to be specific concerns for respective settings but were not consistent across all countries.

Among the top ranked IR questions, health systems approaches for integrating and decentralizing services or increasing access and uptake to interventions were consistently prioritized. Ways of improving rates of retention-in-care were also high in the prioritized lists in each country. Ways to bridge the gap between health facilities and the communities and improve male partner involvement were also common but generally were not ranked as highly as the health systems issues. Health financing and engagement of the private sector were important in Nigeria while not seeming to be of the same concern in Malawi and Zimbabwe.

Perhaps surprisingly, primary prevention of HIV was not evident among the highest ranked questions. Neither was priority given to approaches for improving infant feeding practices, even in the context of ARVs. Although early infant testing was common as part of questions, approaches for increasing rates of initiation of antiretroviral therapy among HIV-infected children were not otherwise emphasized.

**DISCUSSION**

The modified CHNRI process was used to prioritize a set of national IR questions for Malawi, Nigeria, and Zimbabwe that have become the focus of IR projects in the 3 countries. The prioritized questions reflect the diversity of health care settings, competing health challenges and local and national context. Integration of services, strategies to improve retention, and community participation were common priorities in all countries. Being able to explore the differing perspectives of policy makers, researchers and implementers illustrates the value of a systematic, inclusive approach for identifying such priorities. The diversity of persons involved in the respective country exercises also ensured that the research questions identified were relevant and grounded in daily experiences of those delivering services. At the same time, having an overall set of prioritized questions provided researchers with clear direction on what were the top research agenda items.

The process also yielded several benefits that were not as visible as the prioritized research questions. The experiences of health workers who were at the front line of delivering services were fully represented in the consultations and their “scores” were of equal value as those of experienced researchers or senior representatives of the MOH. Although not formally assessed, the health workers expressed their overwhelming support for IR that would tackle the problems identified. While the individual health workers who were present at the meeting did not necessarily become involved in the subsequent research (though some did), the research teams that were later funded were able to proceed with confidence that their research questions were fully representative and relevant to colleagues who were providing services. Having led the prioritization workshops, the respective MOHs were fully supportive of the projects that are now being implemented and have actively engaged with the different IR teams.

In these respects, these country prioritization exercises were distinctive from other research setting processes. In 2009 and 2010, the International AIDS Society and its international partners identified 20 priority research questions that focused on critical knowledge gaps regarding Pediatric treatment through a consultative process that lasted 10 months and included investigators, clinicians, civil society, and United Nation agencies. The process identified broad issues such as the need for investment to specific issues such as how to develop weight-based prescribing ranges. However, the questions were considered in the context of global priorities and did not necessarily reflect local settings or challenges. In Malawi, 24 participants from the Ministry of Health, the National AIDS Commission, and 12 multilateral, nongovernmental organizations and academic partners identified research priorities that significantly focused on the implementation of Option B+.

Priorities were discussed and decided through small group discussions but did not seem to involve district health staff or judge the relevance of the importance of questions through a criteria-based approach.

**ADVANTAGES OF THE CHNRI RESEARCH PRIORITIZATION APPROACH**

- Establishes a credible and relevant IR agenda
- Includes relevant stakeholder groups—national representatives, district staff, researchers and academics, and implementing partners
### TABLE 1. Top 3 PMTCT Implementation Obstacles Identified by Stakeholder Groups in Malawi, Nigeria, and Zimbabwe

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Malawi</th>
<th>Nigeria</th>
<th>Zimbabwe</th>
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<tbody>
<tr>
<td>Ministry of Health staff</td>
<td>1 Low uptake of HIV testing/counseling in ANC settings and sensitivity of HIV tests when routinely used</td>
<td>Removal of user fees for MCH services</td>
<td>Lack of integration of HIV and MNCH services</td>
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<td></td>
<td>2 Low uptake of ARV prophylaxis among HIV-positive women and their exposed infants</td>
<td>Location of health facilities</td>
<td>High user fees leading to drop in ANC attendance</td>
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<td>3 Late attendance at ANC of (all) pregnant women</td>
<td>Staff attrition/distribution</td>
<td>Infant feeding issues</td>
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<td>National partners, including funders, bilaterals</td>
<td>1 Mid- to long-term national funding for the program</td>
<td>Inadequate and inequitable distribution of human resources for health, especially skilled birth attendants</td>
<td>Delay in results to infants and mothers and initiation of relevant treatment</td>
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<td>2 Human resource capacity to implement guidelines including: (1) number of health workers, (2) skills of health workers, and (3) management and governance (ie, use of program data to inform decision-making)</td>
<td>Low status of women and gender inequality</td>
<td>Variable quality of routine data for reporting</td>
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<td></td>
<td>3 Supply chain issues</td>
<td>Inadequate male partner involvement</td>
<td>Staff shortages</td>
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<tr>
<td>Area and district staff</td>
<td>1 Inadequate supply of drugs</td>
<td>Human resource issues including frequent transfers or turnover of staff, especially in hard-to-reach areas</td>
<td>Poor access and uptake of services</td>
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<td></td>
<td>2 Lack of service space; lack of storage facilities</td>
<td>Lack of PMTCT test kits/RTK unavailability and ARVs</td>
<td>Stigma toward people with HIV</td>
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<td></td>
<td>3 Workload</td>
<td>Parallel systems for HIV services—lack of integration</td>
<td>Communication and coordination between MOH and the peripheral health system</td>
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<tr>
<td>Implementing partners</td>
<td>1 Adherence challenges, especially among those who are not “sick”</td>
<td>Weak health infrastructure</td>
<td>Late ANC booking and therefore uptake of services</td>
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<tr>
<td></td>
<td>2 Integrating ART care for tuberculosis, PMTCT, etc</td>
<td>Women do not “traditionally” attend health facilities and transport costs</td>
<td>Mothers and infants drop out of care after delivery</td>
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<tr>
<td></td>
<td>3 Integration of services in rural, peri-urban, and urban areas and doing so on a large scale</td>
<td>Healthcare worker attitude at facility</td>
<td>Getting CD4 samples to the laboratory and results back</td>
</tr>
<tr>
<td>Academics</td>
<td>1 Limited capacity for laboratory monitoring—drug adherence, viral load, monitoring safety, including PCR in infants</td>
<td>Most interventions for PMTCT are not accessible in the community</td>
<td>Gap between mothers known eligible for ART but not being started—HR capacity to initiate ART</td>
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<tr>
<td></td>
<td>2 Low uptake and retention in relatively healthy population—Option B+</td>
<td>Low level of awareness of prevention programs in the community</td>
<td>Better estimation of population coverage of services, especially pregnancies in community not identified</td>
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<tr>
<td></td>
<td>3 Erratic and interrupted drug supply, procurement, and logistics</td>
<td>Logistics and coordination hindering quality of services and delivering national guidelines</td>
<td>Follow-up of HIV-exposed infants, especially HIV testing and extended infant prophylaxis</td>
</tr>
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ART, antiretroviral therapy; PCR, polymerase chain reaction; ANC, antenatal care; MCH, maternal child health; RTK, Rapid Test Kit; HR, Human resource.

**CONCLUSIONS**

The INSPIRE initiative used the participatory CHNRI approach to setting priorities for PMTCT-related IR at the country level. The highest priority questions for each exercise were used as the basis of a call for research proposals. The full list of priority questions were also circulated for reference and use by all participants, including the academic researchers,

- Flexible and consultative
- Clear criteria for scoring results and equal “votes” produce transparent results
- Achieves early buy-in from all levels of the health services; results will be sought right from the beginning
- Establishes relationships between researchers and implementers
- Identifies highest ranking priorities but includes a longer list and specialized priorities.
implementing partners, and funders. The WHO has also used the process to effectively establish IR priorities in other critical aspects of maternal and child health. Our experience has been that it promotes country-ownership and helps direct the strategic allocation of research resources.

**WHAT FOLLOWED**

In each country, within 2 weeks of the CHNRI prioritization exercise, an open call for letters of interest (LOIs) was issued publicly through local advertisements and notices to stakeholders. LOIs were expected to summarize the research idea, including details of proposed formative work, intervention(s), and research design, and to state explicitly how it responded to one of the priority questions. These were scored by an international group of experts who were external to both the WHO and each of the countries. However, they were all experienced in PMTCT IR and all had participated in intervention research in sub-Saharan Africa. LOIs were scored using similar criteria to those used in each country, within 2 weeks of the CHNRI prioritization exercise, an open call for letters of interest (LOIs) was issued publicly through local advertisements and notices to stakeholders. LOIs were expected to summarize the research idea, including details of proposed formative work, intervention(s), and research design, and to state explicitly how it responded to one of the priority questions. These were scored by an international group of experts who were external to both the WHO and each of the countries. However, they were all experienced in PMTCT IR and all had participated in intervention research in sub-Saharan Africa. LOIs were scored using similar criteria to those used in a four-step process that we will describe here.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Malawi (Out of 29 Questions Identified by Participants)</th>
<th>Nigeria (Out of 31 Questions Identified by Participants)</th>
<th>Zimbabwe (Out of 30 Questions Identified by Participants)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>What approaches improve early ANC access and uptake of Option B+ plus retention of mothers and infants in the continuum of care including early infant testing?</td>
<td>How can the private health sector “best” be involved to increase access, uptake, and the quality of PMTCT care?</td>
<td>What models of service delivery, including nurse-led initiation or other decentralization approaches, can accelerate scale-up and implementation of PMTCT interventions and lifelong ART by HIV-infected pregnant women or mothers?</td>
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<td>2</td>
<td>What are the best service delivery models, including cost-effectiveness, to achieve integration of ART, PMTCT, and MNCH services to increase uptake, adherence, and retention of PMTCT interventions?</td>
<td>How can MNCH services and PMTCT programmes best be integrated to increase the availability of essential interventions and improve the quality of care, including retention over time?</td>
<td>What affordable and sustainable models of service delivery can improve coverage and uptake of effective interventions in rural/very rural populations?</td>
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<tr>
<td>3</td>
<td>How can rates of early infant HIV testing be increased and, when required, linked to initiation of pediatric ART?</td>
<td>How can communities best be engaged to improve access and uptake of PMTCT interventions?</td>
<td>What approaches improve retention of mothers and infants in the continuum of care, including early infant testing and providing extending infant ARV prophylaxis?</td>
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<tr>
<td>4</td>
<td>What models of integrated service delivery, including human resource strategies such as task shifting, most efficiently improve coverage, health worker productivity and satisfaction, and quality of services while remaining cost efficient?</td>
<td>How can access and uptake of PMTCT interventions be increased in hard-to-reach areas where there are few health facilities?</td>
<td>What is the feasibility and impact of integrating comprehensive HIV interventions into routine MNCH service?</td>
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<td>5</td>
<td>How can male partner involvement in PMTCT be strengthened and to what extent does this improve access and uptake of PMTCT interventions?</td>
<td>How can financing options, such as removal of user fees or community health insurance systems, be used to alleviate financial constraints and increase access and uptake by women of PMTCT interventions?</td>
<td>How can family and male partner involvement in PMTCT be strengthened and does this improve access and uptake of ART/ARV or other PMTCT interventions?</td>
</tr>
<tr>
<td>6</td>
<td>What (non-laboratory) approaches are feasible, effective and equitable for identifying HIV-infected infants (other than HIV DNA PCR at 6 wk) and for monitoring ARV adherence?</td>
<td>How can the quality and consistency of PMTCT services be improved in facilities to ensure that all mothers and infants, irrespective of place of delivery, receive full and timely PMTCT interventions, including early infant diagnosis?</td>
<td>How can rates of infant HIV testing be increased and, where appropriate, linked to initiation of pediatric ART?</td>
</tr>
<tr>
<td>7</td>
<td>What community intervention models best promote social mobilization and demand for interventions, thereby supporting uptake, linkages, referrals, and follow-up between community and facility?</td>
<td>How can improved political will, commitment, and “ownership” by the national MOH and Federal health services and also by health workers and communities increase uptake of PMTCT interventions?</td>
<td>How can the speed and accuracy of returning results of CD4 tests and early infant testing be improved using mobile phone or other technology?</td>
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<tr>
<td>8</td>
<td>How can health services most effectively respond to the sexual and reproductive needs of adolescents to prevent pregnancies, HIV infections, and MTCT of HIV?</td>
<td>How can HIV-related stigma be reduced in families and communities so that women will have improved access to and uptake of PMTCT interventions?</td>
<td>How can community participation or community-based services increase access and uptake of effective interventions, including facility deliveries?</td>
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ART, antiretroviral therapy; PCR, polymerase chain reaction; ANC, antenatal care; MNCH, maternal, newborn, child health.
to prioritize the IR questions in respective countries. Budgets and feasibility to complete IR projects in the available time were also scoring criteria. Three to 4 teams that received the top scores in each country were then invited to send 3–4 members to a proposal development workshop in Harare in November 2011. At this workshop, experienced research methodologists, including epidemiologists, statisticians, qualitative scientists, and PMTCT experts, were available to work with the teams. Proposals were iteratively developed based on the original ideas in the LOIs. Within 4 weeks of the workshop, teams submitted their full proposals to the WHO for consideration. The full proposals were again sent for external scoring by international experts. Project teams were thereby selected for funding and further support. The full sequence of identifying country-level research priorities, advertising and reviewing concept proposals, sponsoring capacity-building workshops to support full proposals, and external review, selection, and funding was carried out within 9 months, with the key steps summarized as follows:

- Country prioritization exercise
- Open call for LOIs (6 page concept note)
- External review/scoring and selection of best LOIs (3–4 per country)
- Regional proposal development workshop for the 3–4 teams per country (November 28, 2011 to December 2, 2011)
- Full proposals sent for external review and scoring
- Selection of country project(s)
- Funding and implementation.

Details of the 6 funded projects are included in this supplement.

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REFERENCES